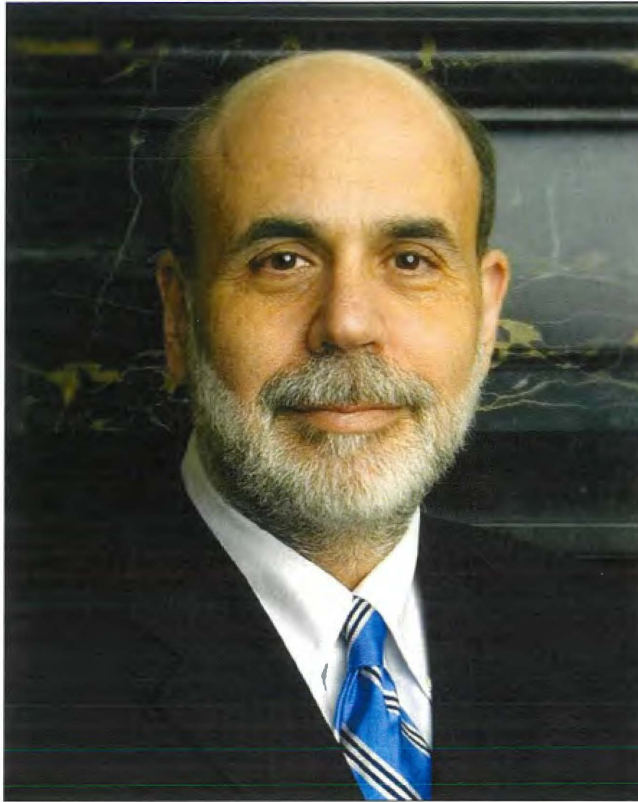


**EXHIBIT 18**  
**[FILED UNDER SEAL]**



## Beyond Bernanke

gTrade  
Aug 17, 2015



**ATTORNEY CLIENT  
PRIVILEGED**



## Presentation Overview



- Bermanke Background
- Bermanke Issues
- Beyond Bermanke

## Pre-Bernanke



- Before DRS (2012)
  - Submit top two CAT2 bids to the AdX auction after deducting GDN buy-side margin of 15%
  - Lose auctions above  $0.85 * \text{CAT2 1st bid}$



## Pre-Bernanke



- Before DRS (2012)
  - Submit top two CAT2 bids to the AdX auction after deducting GDN buy-side margin of 15%
  - Lose auctions above  $0.85 * \text{CAT2 1st bid}$
- DRS (early 2013)
  - Do not deduct GDN margin off the top bid
  - Win new auctions clearing between  $[0.85, 1.00] * \text{top bid}$
  - Profit increases; profit margin drops slightly to  $\sim 14.x\%$

## Pre-Bernanke



- Before DRS (2012)
  - Submit top two CAT2 bids to the AdX auction after deducting GDN buy-side margin of 15%
  - Lose auctions above  $0.85 * \text{CAT2 1st bid}$
- DRS (early 2013)
  - Do not deduct GDN margin off the top bid
  - Win new auctions clearing between  $[0.85, 1.00] * \text{top bid}$
  - Profit increases; profit margin drops slightly to  $\sim 14.x\%$
- In all cases, advertiser is charged
  - $\min(\text{CAT2 1st bid}, \max(\text{AdX Clearing} / 0.85, \text{CAT2 2nd bid}))$

## Bernanke (late 2013)



- Main insight

DRS: Target (up to) 15% margin per query



Bernanke: Target 15% margin per (query segment) x (time period)

- Typical segments: {web property x sub web property x mobile}
- Typical time period: 1 day

## Bernanke (late 2013)



- Bernanke solves this optimization problem:

**Maximize**

Buy-side revenue ( $\text{RPM} * \text{Queries}$ ) per day

**By Calculating**

Bid multipliers on 1st and 2nd bid submitted to AdX auction  
per inventory segment (wp x swp x mobile)

**Subject to constraints:**

Same advertiser auction ranking and charging as DRS  
Buy-side margin 15% per segment x day

## Global Bernanke (mid-2015)



- Global Bernanke solves slightly modified optimization problem:

### Maximize

Buy-side **value** ( $\text{RPM} * \text{CPD} * \text{Queries}$ ) per day

### By Calculating

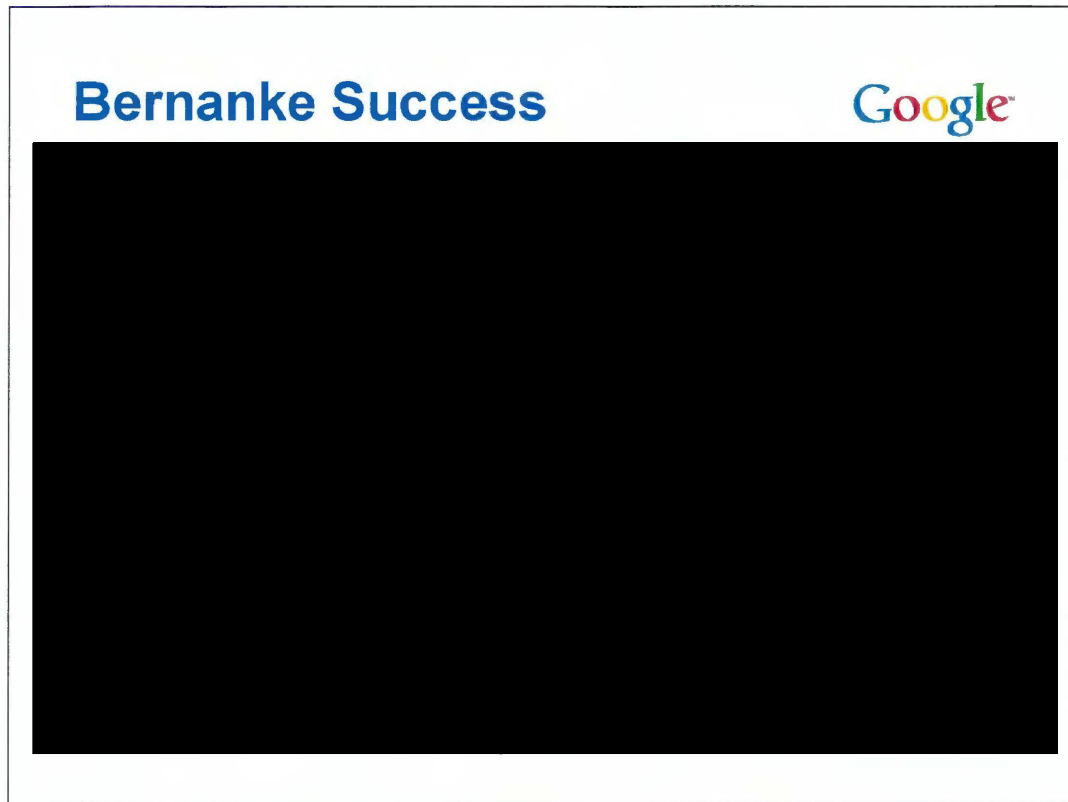
Bid multipliers on 1st and 2nd bid submitted to AdX auction per inventory segment (wp x swp x mobile)

### Subject to constraints:

Same advertiser auction ranking and charging as DRS

**Min and max** buy-side margin per segment x day

**Overall AdX buy-side margin of 15% on mobile, desktop**



Global bemanke just launched; may update image with more data...

## Issue 1: Margin Constraint

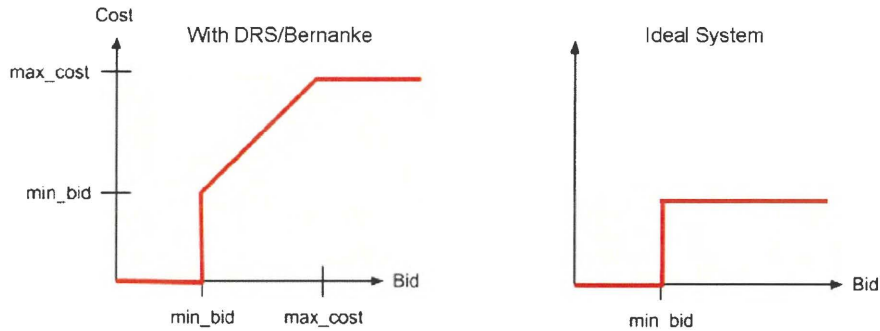


- First bid multiplier > 1.0 is artifact of self-imposed 15% margin
- [REDACTED]
- GDN deliberately loses money on billions of queries / day, primarily to subsidize publishers and drive down margin [REDACTED] -> 15%

## Issue 2: Advertiser Cost



- Bernanke (and DRS) have a first-pricing region where query is subsidized and advertiser cost increases with bid

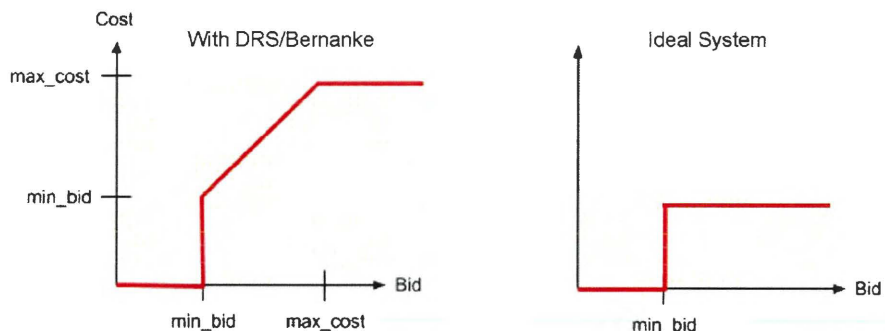




## Issue 2: Advertiser Cost




- Bermanke (and DRS) have a first-pricing region where query is subsidized and advertiser cost increases with bid
  - 100% of incremental Bermanke inventory is first priced
  - MH-CPD is [REDACTED] worse (no auction discount)
  - “Smart” auto-bidding frameworks like conversion optimizer ([REDACTED]) have incentive to reduce bids to exploit subsidy



## Issue 3: Sell-side Constraints

- Sell-side constraints (max margin per pub) in a buy-side algorithm makes innovation slower/harder on both sides
- Buy-side changes hard to launch without sell-side approval, concerns about “sensitive” publishers
- Sell-side projects like RPO have strange interactions with Bernanke, causing experiment issues and pushback at launch

## Issue 4: Limited Future Gains

- After 2 years of improvements, unlikely to extract much more gains
- Main knob is keep increasing max margin allowed per segment
  - 
  - Some publishers must have big payout loss to achieve this
- Some potential launches may even decrease revenue, such as opting conversion optimizer traffic out of Bernanke

## Beyond Bernanke



Suppose

- Goal: GDN wants to maximize **profit**
- Constraint: Charge advertisers based only on competition
- Assume: AdX runs clean second price auction with single call with reserve price

## Beyond Bernanke



Suppose

- Goal: GDN wants to maximize **profit**
- Constraint: Charge advertisers based only on competition
- Assume: AdX runs clean second price auction with single call with reserve price
  
- Mechanism:
  - Submit to AdX: CAT2 first bid, no second bid
  - Charge  $\max(\text{CAT2 second bid}, \text{AdX clearing price})$

## Beyond Bernanke



Suppose

- Goal: GDN wants to maximize **profit**
- Constraint: Charge advertisers based only on competition
- Assume: AdX runs clean second price auction with single call with reserve price
  
- Mechanism:
  - Submit to AdX: CAT2 first bid, no second bid
  - Charge  $\max(\text{CAT2 second bid}, \text{AdX clearing price})$
  
- Advantages
  - Simple!
  - Market sets price; no first-pricing region or target margin
  - No more artificial subsidies to publisher
  - Decouples buy-side and sell-side

## Transition Phase



- Want to avoid large publisher payout drop
- Initially GDN continues submitting two bids
  - GDN1 = CAT2 1st bid
  - GDN2 =  $f(\text{Query features})$
- Experiment with  $f()$  until payout is **close** to today's Bernanke payout to publishers.
- $\max(\text{pub reserve}, f())$  becomes the new sell-side RPO for GDN
- Buy-side and sell-side are decoupled from that point onward

## Buy-side margin



- If buy-side margin too high
  - Re-invest the money for maximum benefit to advertisers
    - Buy more inventory for strategic customers [REDACTED] regardless of publisher source
    - Offer fixed CPA product, paying any bidding errors or auto-targeting exploration from this money
    - Many other ways to spend \$\$\$\$...



## Buy-side margin



- If buy-side margin too high
  - Re-invest the money for maximum benefit to advertisers
    - Buy more inventory for strategic customers, [REDACTED] regardless of publisher source
    - Offer fixed CPA product, paying any bidding errors or auto-targeting exploration from this money
    - Many other ways to spend \$\$\$\$...
- If buy-side margin is too low
  - Shift \$ from advertiser to Google, reducing CPD and volume
    - $\text{bid} = (1-m) * \text{CAT2 1st bid}$
    - $\text{charge} = \max(\text{Adx clearing price}, \text{CAT2 2nd bid}) / (1-m)$
    - Set  $m$  for minimum margin, or to equalize CPD between AdX, AdSense

## Summary



- Bermanke maximized revenue given 15% margin constraint and same CAT2 auction ranking/pricing as DRS; highly successful, [REDACTED]
- Further Bermanke enhancements may not have big upside potential
- Bermanke has several issues with advertiser pricing, entangling buy-side / sell-side goals, and throwing away profit overpaying for lower-quality inventory
- A simpler bidding and pricing strategy may be achievable by developing a more effective publisher RPO



## **Beyond Bernanke Yellen?**

gTrade  
Aug 17, 2015



**ATTORNEY CLIENT  
PRIVILEGED**